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The Implementation of Integrated Quality Function Deployment (QFD) and SWOT Analysis in the Quality Improvement Strategy of Jackfruit Chips

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Abstract

Quality is one inseparable attributes that should be noted in fulfilling consumers' need and expectation. Each product must have certain advantages in order to be able to compete in the market. Customers' loyalty is the key to sustainable quality improvement. CV X is a business unit located in Malang selling various snack souvenirs products from Malang. This souvenirs shop has become one of the main destinations for shopping snack souvenirs in Malang. Furthermore, jackfruit chips are one of the most popular fruit chips sold by CV X. The increasing popularity of jackfruit chips in the market will affect the quality expected by consumers. Quality Function Deployment (QFD) is one of the most effective tools that can support a company or business unit by creating a response to consumer needs, explaining consumer's demand toward certain products and determining any process needed to meet consumer's expectations. The objective of this study is to analyze several attributes that affect consumer satisfaction on jackfruit chips produced by CV X. The results of this study suggest that a product with stable volume is in the first place with the value of 7. Meanwhile, from the data analyzed with Strength Weakness Opportunity Threat (SWOT) Analysis, the result indicates that the product value is on the S-O position, with specific indicators of having a competitive price and market leader.

Keywords: jackfruit chips, improvement strategy, quality function deployment

INTRODUCTION

Quality is one inseparable attributes that should be noted in fulfilling consumers' necessity and expectation. Each product must have certain advantages among other similar products, so that it can compete well in the market. Customers' loyalty is the key of every success, not only in the short term, but also as a part of sustainable quality improvement. This is because customers' loyalty has a strategic value for business unit and becomes an asset of high value product (Rucitra, Santoso & Astuti, 2014). CV. X is one of the business units that is specializing in souvenir-selling in Malang. A variety of Malang typical food souvenirs are produced and sold, and this has brought CV.X to become a tourism destination for visitors who are looking for Malang typical souvenirs. Jackfruit chips is one of the featured products of CV X. The higher popularity of this product in the market increases consumers' expectation. Expectation is the key point for every business person involving in customer satisfaction. Failure in managing customer's expectation will bring difficulties for the company in serving an optimum level of satisfaction to their customers (Ridwan, 2012).

Consumer's expectation can be gauged by using the method so that all product priority aspects can be figured out and noted as an effort to fulfill and develop quality for consumers. There are many methods that can be used to measure consumer satisfaction level, such as Importance Performance Analysis (IPA), SERVQUAL and Quality Function Deployment (QFD). According to Suryaningrat et al. (2010), QFD application is one of the effective tools which can provide various information on consumers' needs and wants, manufacturers' necessity and product needs.

The use of QFD method can be integrated with other methods in order to formulate strategic policy for business unit, as seen from its internal and external aspect. One of the proper integration methods for QFD is the use of SWOT analysis. SWOT analysis is a systematic procedure to identify certain success determinant factors applied by the company, such as internal strength and weakness, and opportunity and external threat (Blocher, Stout, & Cokins, 2011). However, ac-

cording to Wanti, Taufiqurrahman & Rahayu (2014) SWOT analysis is a crucial strategic planning tool to support the planning for comparing company internal strength and weakness with external opportunity and threat. The objective of this study is to determine expected attribute and priority of satisfaction compared with CV Y and to obtain any strategies to develop quality of jackfruit chips product from CV. X, compared with CV Y.

METHODS

This research used quantitative descriptive research that is a research performed to raise any facts, current situation and phenomenon and presented with data. Research design applied was survey design, which is a design aimed at collecting sample of the previously determined population. Survey design used in this research was questionnaire.

Data Collection Methods

Data collection method was initiated with observing jackfruit chips product. Questionnaire was created based on the house of quality. After all data were gathered, data analysis and discussion were performed. The measurement of consumer satisfaction levels towards jackfruit chips product from CV X was conducted using an integration between QFD and SWOT. QFD method was applied as a research underlying basis to identify consumer needs as well as to compare the measurement of consumer satisfaction levels with CV Y. Meanwhile, SWOT analysis was used to complete the result and aiming at monitoring any process on the highest quality characteristic. Priority weight of jackfruit chips quality and internal and external factors was performed by using pairwise comparison methods.

This research divided the respondents into two groups, consumer respondents and expert respondents. For consumer respondents, sample of the respondents were calculated based on Slovin's formula and there were 47 respondents. Expert respondents are the respondents whose information and expertise will be used as research data source. In this research, there were 3 (three) expert respondents which includes CV X owner and academics. Sampling technique for expert respondents were performed by judgement sampling.

RESULTS AND DISCUSSION

Marketing is an important aspect for CV X, as its location is within easy reach by consumers and it has already had a brand image as a pioneer of a variety of typical Malang souvenirs. CV. X target are the tourists visiting Malang. In deciding market target, company needs to pay attention to the defined segment scale/amount and existing competition position in the targeted segment, so that there will be strict competition and the unit business needs to be focus on the customer (Wijaya & Sirine, 2016). Customers' satisfaction extremely depends on the customer perception towards a product. Customers' needs and expectations are stated in product specification and named as customer requirements. Business unit must make the best effort to produce high quality product that meets customer's expectation. Based on the questionnaire distribution, sample of respondents used in this research were people who have consumed any products of both CV X and CV Y.

Validity and Reliability Test

In this study, research instrument testing was conducted to figure out the validity and reliability of the research instrument. Validity and reliability testing was conducted using SPSS 20 software, based on moment product value (r) with n = 47 in significance levels of 5%. Result of validity testing showed that the questions of each attribute can be used to measure product quality dimension, because validity coefficients value of interest level and consumer satisfaction evaluation of each question attribute has r-calculation > r-table value. Therefore, it is concluded that the connection of each question attribute was valid. Whereas, based on the reliability testing result, it is suggested that reliability value of each variable was as many as and above 0.6. Thus, the instrument used in this research was reliable, as shown in Table 1.

Customer Satisfaction Analysis

Planning Matrix (What)

a. Importance to customer

Customer interest is customer’s perception on how important the quality attribute of each existed or currently offered product in fulfilling their needs/ expectation. The degree of interest was obtained by dividing the total score of questionnaire with the amount of respondents. Result of this assessment shows the interest level

Table 1. Reliability test results

Variable	Alpha Cronbach	Explanation
Interest Level	0.906	Reliable
Satisfaction Evaluation X	0.945	Reliable
Satisfaction Evaluation Y	0.947	Reliable

Table 2. Levels of customer interest

No	Attribute	Interest	Ranking
1	Chips texture	4.17	8
2	The color matches its original color	4.21	7
3	Jackfruit chips taste	4.53	1
4	Distinctive aroma of jackfruit	4.12	9
5	The price is worth the quality	4.21	6
6	The price is cheaper than competitor's price	4.04	12
7	Comprehensive information	4.42	4
8	Volume/packaging stability	4.45	2
9	Packaging size	4.06	11
10	Outlet cleanliness	4.43	3
11	Outlet feasibility	3,98	13
12	Responsiveness to request	4.12	10
13	Outlet convenience	4.30	5

Table 3. The comparison of CSP calculation result

No.	Customer-Expected Attributes	CSP	
		CV X	CV Y
1	Jackfruit chips texture	4.28*	4.30
2	The color matches its original color	4.28	4.06
3	Jackfruit chips taste	4.36	4.21
4	Distinctive aroma of jackfruit	4.20	4.13
5	The price is worth the quality	4.30	4.11
6	The price is cheaper than competitor's price	4.17	3.96
7	Comprehensive information	4.21	4.09
8	Volume/packaging stability	4.17	3.91
9	Packaging Size	4.02*	4.13
10	Outlet cleanliness	4.26	4.04
11	Outlet feasibility	4.13*	4.17
12	Responsiveness to request	4.15*	4.21
13	Outlet convenience	4.19	4.17

of customer expectation in having the expected quality of jackfruit chips from CV X. The calculation of the degree of interest can be seen in Table 2. From Table 2, it can be seen that jackfruit chips taste is in the first position in determining the rank of CV X jackfruit chips product. In this case, taste is one of the intrinsic product attribute. In selecting typical food they consume, consumers pay more attention to the taste offered to them, since taste is much associated with consumers' appetite. This is in accordance with the statement of Indrasari, Ichsannudin & Purnomo (2017) which mentioned that there is a significant impact between product taste and customer satisfaction.

b. Customer satisfaction performance (CSP)

The assessment of customer satisfaction level on jackfruit chips products was obtained from the result of questionnaire distribution on the customer satisfaction evaluation. This assessment result shows how business unit performance meets its customers' needs. This quality assessment result of jackfruit chips product from CV X is compared with jackfruit chips product from CV Y, another business unit that produced Malang typical souvenirs, which is located in the souvenirs center of Sanan, Malang. Performance calculation of consumer satisfaction attribute towards jackfruit chips product can be seen in Table 3.

Based on Table 3, among the 13 attributes of jackfruit chips product from CV X, 9 attributes have higher Customer Satisfaction Performance (CSP) value than its competitor, and 4 attributes have lower CSP value than its competitor. However, although CSP values of those four attributes are lower than its competitor, it does not really affect the consumer satisfaction towards the business unit, as according to the consumers, the interest levels of those four attributes are also low (Table 2).

c. Target value of each attribute (goal)

Target value is defined by comparing achievement between CV X customer evaluation and its competitor. This target value then becomes business unit's reference to improve customer expected attribute towards jackfruit chips product from CV X, as presented in Table 4. The highest target value is 4.36 that is in the chips taste attribute, since tasty products really affect consumers' perception towards the products. The lowest target value is in the packaging size attribute since jackfruit chips is including in high-priced fruit chips product category, so that the size is less varied and produced in a limited

quantity to keep it crisp. Although a product has mentioned its weight or volume in the packaging, the packaging size also affects buyer's psychology. (Resmi & Wismiarsi, 2015).

d. Weight of each attribute (raw weight)

Priority weight must be determined first in order to improve and develop customer satisfaction attribute towards any products manufactured by CV. X. This weight was obtained based on the levels of customer interest, improvement ratio and selling point. The results can be seen in Table 5.

In Table 5, it is known that there are 2 attributes which have highest weight of 7.5, those are chips taste and volume stability per packageing. These attributes need to improve in order to meet customer satisfaction.

Technical Response (How)

Technical response (how) contains the information about manufacturer's needs and interests. Technical response can be obtained by conveying customer expectation or wants into development characteristic. Thus, this matrix can be considered as the opposite of what. CV X Malang as a manufacturer of jackfruit chips was selected as the center of quality assessment, and the technical characteristics were obtained by interview process.

This technical response identification is based on the product attribute from the result of preliminary survey and interview process. It is divided into 4 criteria, which are product quality, product price, product packaging and service. Determination of potential technical response is defined by using AHP method.

The stages of potential weight determination is performed by calculating geometric mean, criteria weight and consistency ratio to figure out the assessment consistency. Technical response of CV. X jackfruit chips consumer satisfaction is presented in Table 6 which consists of 3 parts, which covers:

The main goal, which is the technical response of consumers' satisfaction.

1. The criteria based on the product attributes, which are product quality, product price, product packaging and service.
2. Strategy, as an initial identification step of various technical characteristics.

From Table 6, it is known that in the criteria levels, product price ranks highest. In strategy level, product selling price determination is on the highest technical characteristic. After knowing the highest weight of each level, that attribute can be prioritized to improve and enhance the quality of jackfruit chips product, in order to increase

Table 4. Target value (goal)

No.	Customer-Expected Attribute	Target Value (Goal)
1	Jackfruit chips texture	4.30
2	The color matches its original color	4.28
3	Jackfruit chips taste	4.36
4	Distinctive aroma of jackfruit	4.20
5	The price is worth the quality	4.30
6	The price is cheaper than competitor's price	4.17
7	Comprehensive information	4.21
8	Volume/packaging stability	4.17
9	Packaging size	4.13
10	Outlet cleanliness	4.26
11	Outlet feasibility	4.17
12	Responsiveness to request	4.21
13	Outlet convenience	4.19

Table 5. Result of raw weight calculation

No.	Customer-Expected Attribute	Raw Weight
1	Jackfruit chips taste	7.5
2	Volume/packaging stability	7.5
3	Comprehensive information	6
4	Outlet Cleanliness	6
5	Outlet Convenience	6
6	Packaging Size	4.93
7	Responsiveness to Request	4.87
8	Outlet Feasibility	4.85
9	Jackfruit chips texture	4,82
10	The color matches its original color	4.8
11	Distinctive aroma of jackfruit	4.8
12	The price is worth the quality	4.8
13	The price is cheaper than competitor's price	4.8

Table 6. Consumer satisfaction technical response

Level	Attribute	Weight
Criteria	Product Quality	0.156
	Product Price	0.438
	Product Packaging	0.241
	Service	0.165
Strategy	Fruit quality selection	0.177
	Storage	0.099
	Processing Technique	0.111
	Packaging Technique	0.117
	Product Selling Price Determination	0.383
	Speed of Responding to Consumer	0.113

consumer satisfaction. Price variable gives impact to customer satisfaction as price is closely related to the product marketing to consumer, and often compared with other business unit. Consumers are highly sensitive to payment scheme; if they are satisfied with the quality and payment scheme, they tend to be satisfied with the products.

Consistency Ratio

Consistency Ratio (CR) is the value that is used to find consistency levels of the respondents in performing assessment of each technical response criteria of consumer satisfaction improvement in CV X. Respondents will be considered as consistent if the consistency ratio value is less than 0.1. The hierarchy of consistency ratio must be equal to or less than 10%. If the requirement is not fulfilled, then the information quality must be corrected by revising paired comparison question. The result of consistency ratio (CR) of the primary data analysis obtained in each level is lower than 0.1, which is 0.066415 for level 2 and 0.060828 for level 3. This shows that each level has been consistent and revision of the calculation is not required.

Matrix of Connection between What and How

The interaction between the incorporated attribute of what and how will reveal a strong connection between one attribute and another. This interaction is highly needed as both are derived from different sources. QFD analysis is useful to figure out the connection between customer expectation and obtained technical response. This relationship is marked by using symbols with the scale of 1-3-9. The symbols used can be seen in Table 6. Correlation between customer expectations with technical characteristic is generally marked with symbol. Symbols used here usually consist of three levels; weak, medium and strong. This relationship is then reflected in Figure 1 as a part of the House of Quality.

Benchmarking

Benchmarking is a measure (benchmark) of performance level from technical response that is used as a performance comparison from the technical response that will affect jackfruit chips quality produced by CV X, in comparison with its competitor, CV Y. Benchmarking value is obtained from the multiplication of relationship value between what and how with consumer satisfaction level value of CV X, then it is divided by the amount of what and how correlation matrix value. Based on the calculation result obtained, each performance can be seen in Table 7.

Target

Target is a planning measure that is used to comply with the technical response requirements based on the comparison of performance in benchmarking calculation. CV X can use this method to decide which measure to apply in the effort of increasing consumers' satisfaction. Any

	Fruit quality selection	Storage	Proper processing technique	Appropriate Packaging Technique	Appropriate product's selling price	Speed of responding to
Jackfruit Chips Texture		●	○	●		●
The color matches its original color	○	○				
Jackfruit Chips taste	●	●	●	○		Δ
Distinctive aroma of jackfruit		Δ	○			
The price is worth the quality	●		●	○	●	○
The price is cheaper than competitor's price					Δ	
Comprehensive information						
Volume/packaging stability					○	
Packaging size				●		
Outlet cleanliness						
Outlet feasibility						○
Responsiveness to request			●	○		●
Outlet convenience						○

Description:
● = strong relationship; ○ = moderate relationship; Δ = weak relationship

Figure 1. Relationship Matrix between Customer Expectation and Technical Response

Table 7. Performance comparison result

No	Technical Response	CV X	CV Y
1	Fruit quality selection	4.323	4.146
2	Proper storage	4.309	4.223
3	Proper processing technique	4.265	4.184
4	Appropriate packaging technique	4.191*	4.202
5	Appropriate product's selling price	4,260	4.052
6	Speed of responding to consumer	4.208*	4.220

Description: * = contains lower performance value

Table 8. Target value

No	Technical Response	Performance		Target	Description
		AR	X		
1	Fruit quality selection	4.32	4.15	4.32	-
2	Proper storage	4.31	4.22	4.31	-
3	Proper processing technique	4.27	4.18	4.27	-
4	Appropriate packaging technique	4.19*	4.20	4.20	Improved
5	Appropriate product's selling price	4.26	4.05	4.26	-
6	Speed of responding to consumer	4.21*	4.22	4.22	Improved

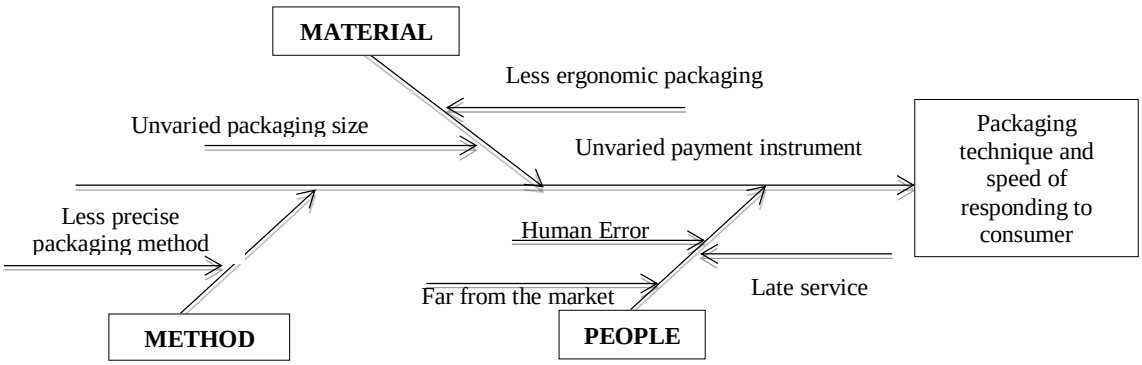

Figure 2. Cause and Effect Chart of Packaging Technique and Speed of Responding to Consumer Attribute

measure that can be performed include increasing or retaining appropriate attribute as expected target. Based on the performance comparison, this target value obtained can be seen in Table 8.

The target value can be seen based on the benchmarking comparison between CV X and CV Y. As the value of some attributes are lower than competitor's value, CV X needs to improve its quality in compliance with the performance comparison value. Target value is determined based on the highest value of the competitor or exceeded the highest value of the competitor on the performance comparison in bench-marking, the simplicity levels of each attribute also needs to be adjusted in improving the quality.

Highest Quality Identification

Fishbone Diagram

Based on the target value obtained using QFD method, it is known that the packaging technique and business unit speed of responding to consumer are characteristics that can be caused by 3 factors; method, material and people, as is shown in Figure 2.

Cause and effect chart in Figure 2 is obtained from brainstorming process with expert respondents, in this case the CV X owner. Based on the identification result, it is known that the lowest attribute in jackfruit chips production is the packaging technique and response speed to consumer. For that reason, it is concluded that there are certain variables, including material, people and method that are being the causes of those two results. Material variable has 3 problem causes, those are less ergonomic packaging, inadequate payment instruments and unvaried product packaging size. Method variable consists of 1 problem cause, which is suboptimal packaging method so that there are a lot of rejected packaging as the packaging technique must be repeated. The third variable is People, it consists of 3 causes, those are human error which causes problems related to process and service, less strategic outlet location so that it is far from the

market, and also late service caused by inexperienced work forces.

External and Internal Factors Evaluation

SWOT Matrix is a matrix showing technical response that must be performed by CV X to improve packaging technique and speed of responding to consumer. The strategies that should be applied by CV X in the improvement of packaging technique and speed of responding to consumers' attribute are shown in Table 9.

Company position is determined based on IFE and EFE Matrix in Table 9, by creating a 4-quadrant Cartesian chart. Cartesian chart is shown in Figure 3. Based on SWOT Cartesian chart in Figure 3, it can be seen that jackfruit chips from CV X is in quadrant I. It means that the strategy used here is Strength-Opportunity(S-O) or also known as Growth strategy. Growth strategy means that there is an increase in its product cycle. Details of SWOT matrix comparison are provided in Table 10.

Based on the research and data analysis using SWOT, the result shows that product value is in S-O position with the indicators of competitive product price, market leader, and Malang as tourism object. Based on the jackfruit chips product price, the product from CV X is in medium category for consumer. Besides, CV X is also a market leader for fruit chips product in the market

Table 9. Internal factors evaluation (IFE) and external factors evaluation (EFE)

Explanation on Internal and External Factors	Weight	Rating	Score
1. Strength			
• Competitive price	0.15	4	0.6
• Full automated tools	0.15	4	0.6
• Market leader	0.15	4	0.6
Sub Total	0.45		1.8
2. Weakness			
• Fluctuating availability of raw materials	0.2	2	0.4
• Limited R&D facilities	0.2	2	0.4
• Unvaried packaging size	0.2	2	0.4
Sub Total	0.55		1.2
Total score of strength - weakness factors	**1**		**3.0**
3. Opportunity			
• Malang is a popular tourism destination	0.45	4	1.8
• Fruit processed products are quite popular	0.2	3	0.6
Sub Total	0.65		2.4
4. Threat			
• More competitors	0.15	3	0.45
• An increase in worker's bargaining power	0.1	3	0.3
• The sales agent is unavailable	0.1	3	0.6
Sub Total	0.35		1.35
Total score of opportunity - threat factors	**1**		**3.75**

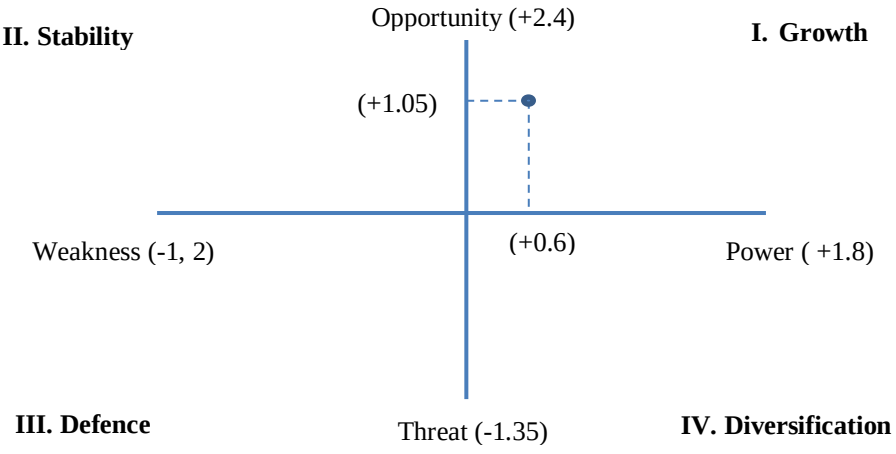

Figure 3. SWOT Cartesians Chart

Table 10. SWOT matrix comparison

SWOT Matrix	Internal Factor	
	Strength	**Weakness**
Opportunity	Competitive price Market leader Malang as a popular tourism destination	Fluctuating availability of raw materials Unvaried packaging size
Threat	Malang is a popular tourism destination Fruit processed products are quite popular	More competitors An increase in worker's bargaining power The sales agent is unavailable

so that it can be a brand image for any consumers who like to consume fruit processed products. In addition, any tourists visiting Malang can choose jackfruit chips as a food souvenir.

CONCLUSION

Based on this research, the result shows that there are several expected attribute and priority satisfaction compared with CV Y. According to the respondents, customer satisfaction towards jackfruit chips product from CV X is relatively high and the customers are satisfied with the products. Customer satisfaction attribute order in sequence were chips taste (7.5); volume stability (7.5); comprehensive information (6); outlet cleanliness (6); outlet convenience (6); packaging size (4.93); responsiveness to request (4.87); outlet feasibility (4.85); jackfruit chips texture (4.82); the color matches jackfruit original color (4.8); distinctive aroma of jackfruit (4.8); the price is worth the quality (4.8); the price is cheaper than competitor's price (4.8).

Based on the SWOT Cartesian chart, it is known that jackfruit chips of CV X is located in quadrant I, which means that the strategy used is Strength-Opportunity (S-O) strategy, as known as Growth strategy. Growth strategy means that there is an increase in its product cycle, with the indicators of competitive product price, market leader and Malang as a tourism destination. Based on the jackfruit chips product price, the product from CV X is in medium category for consumer. Besides, CV X is also a market leader for fruit chips product in the market, so that it can be a brand image for any consumers who like to consume fruit processed products. In addition, any tourists visiting Malang can choose jackfruit chips as a food souvenir.

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